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SOLID POLYMER FUEL CELL SYSTEM AND METHOD FOR HUMIDIFYING AND ADJUSTING THE TEMPERATURE OF A REACTANT STREAM

Abstract

Reactant gas supply streams for solid polymer fuel cells may be heated and humidified using heat generated by the fuel cell and water vapor from the fuel cell exhaust. The heat and water vapor in the oxidant exhaust stream are sufficient to heat and humidify a reactant gas supply stream, preferably the oxidant supply stream. The heating and humidifying can be accomplished by flowing a reactant gas supply stream and a fuel cell exhaust gas stream on opposite sides of a water permeable membrane in a combined heat and humidity exchange apparatus. The method and apparatus are particularly suitable for use with air-cooled fuel cell systems and systems which employ near ambient pressure air as the oxidant gas supply.